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PROPELLANT POWDER CHARGE.

No Drawing.

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The subject of this invention is a propellant powder charge, devised, primarily for use in a trench mortar of the Stokes type, though not limited to such use but which may be employed wherever a propellant powder is desirable.

The main objects of the present invention are: the provision of a flashless, non-hygroscopic propellant powder which may be prepared in such form that the propellant charge container usually used with a trench mortar bomb may be eliminated, and also that with the same elevation of the mortar greater flexibility of range may be secured.

Further objects of the invention will appear as the description proceeds.

In the usual trench mortar bomb a black powder cartridge, preferably of 12 gauge, is fitted in the shell container. Former practice has been to provide a propellant charge consisting either of silk rings filled with cordite or nitrotite (a modified cellulose) rings filled with ballistite. These rings are fitted over the shell container and are ignited by the powder charge in the blank cartridge which flashes through the apertures in the container.

The present form of propellant consists of a number of thin disks the centers of which are stamped out to enable the rings to be slipped over the shell container, the remaining annular sheet is perforated with numerous small holes of suitable spacing and dimensions to insure the desired rate of burning. This form of grain or disc is also suitable for use with the British type of bomb in which instance the rings are placed in the powder receptacle over the detonator. The grain or disc is preferably obtained by rolling the previously mixed ingredients into sheets between hot rolls until the proper thickness to give the required ballistic results has been secured. The grains are then stamped out from these sheets by means of dies.

The powder from which the grains or discs are formed is composed of nitrocellulose, nitroglycerine and nitro aromatic hydrocarbons. To this mixture may be added, if desired, any suitable stabilizer but I prefer

to use diphenylamine as the reagent. It has also been found desirable to include as an ingredient of this mixture a flame reducing element or elements to the end that the flash given off upon firing the mortar may be reduced to such an extent as to be invisible at a distance of a few hundred yards.

From the foregoing it is evident that my invention consists in forming a compound of nitrocellulose, nitroglycerine and nitrated aromatic hydrocarbons to which may be added, if desired, a stabilizing reagent and a flame reducing element or elements and a subsequent treatment of such mixture to form the same into grains or discs. By way of example the following mixtures or ingredients are submitted.

Nitrocellulose 40 plus or minus 5 parts.

Nitroglycerine 20 plus or minus 5 parts.

Dinitro aromatic hydrocarbons 10 plus or minus 5 parts.

Trinitro aromatic hydrocarbons 30 plus or minus 5 parts.

Diphenylamine 1.1 plus or minus 1 part.

The dinitro-aromatic hydrocarbon is usually, but not necessarily dinitrotoluene, and the trinitro aromatic hydrocarbon is preferably but not necessarily trinitrotoluene.

The above composition is non-hygroscopic and gives considerably less flash than the cordite or the ballistite usually employed. This mixture may, however, be modified so that on firing only a few sparks or a dull red ball of flame hardly visible at a few hundred yards results by replacing up to 10% nitro aromatic hydrocarbon with a flame reducing element such as corn starch or black powder ingredients or both.

A successful flashless powder of this type has the composition

	Parts.	95
Nitrocellulose	35	
Nitroglycerine	25	
Dinitrotoluene	5	
Trinitrotoluene	20	
Cornstarch	5	100
Black powder ingredients	5	

The addition of cornstarch tends to make the powder more difficult to work between the rolls on account of the reduction in plasticity. The cornstarch increases the hygroscopicity. These deleterious defects may be overcome by increasing the nitroglycerine

content and a highly satisfactory flashless non-hygroscopic propellant has been formed from the following ingredients:

- Nitrocellulose 30 plus or minus 5 parts.
- 5 Nitroglycerine 35 plus or minus 5 parts.
- Starch 15 plus or minus 5 parts.
- Black powder ingredients 5 plus or minus 5 parts.
- 10 Nitro aromatic hydrocarbons 15 plus or minus 5 parts.

It is evident that the discs of powder formed from the compositions above set forth, being thinner and less cumbersome

than the old silk or celluloid rings, of four of which could be used, will permit greater range of propellant charge as more or less rings may be placed upon the cartridge container and so secure a more flexible range without changing the elevation of the mortar.

I claim:

A propellant powder including nitrocellulose 35 parts, nitroglycerine 25 parts, dinitrotoluene 5 parts, trinitrotoluene 20 parts and flame reducing materials 10 parts.

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